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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,729	03/21/2006	Nobukazu Kawagoe	YMMRP0104US	6882

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EXAMINER
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KONG, SZE-HON

ART UNIT	PAPER NUMBER
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3661

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/572,729	<b>Applicant(s)</b> KAWAGOE ET AL.	
	<b>Examiner</b> SZE-HON KONG	<b>Art Unit</b> 3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/21/2006 and 3/26/2009</u> .                                 | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on 3/26/2009 was filed. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

3. The drawings are objected to because Fig. 4 and Fig. 15(b) only provide boxes with reference numbers but does not have proper label for the elements to clearly identify and show the structure and relation of the invention. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top

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margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 4 and 6-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "a left-right direction" (claim 6 and 7, line 5) is not clear because while a single first distance sensor is provided at a center location, a left-right direction is ambiguous.

The term "close to" in claim 4 (line 2), 6 (line 7) and 7 (line 7) is a relative term which renders the claim indefinite. The term "close to" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "traveling speed is high" in claim 10 (lines 2-3) is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one

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of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "traveling speed is low" in claim 10 (lines 3-4) is a relative term which renders the claim indefinite. The term "low" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "if" in claim 9 (line 2) causes the clause follows ambiguous because it does not provide condition when the detected contact time is shorter than a predetermined time.

The term "if" in claim 11 (line 40) causes the clause follows ambiguous because it does not provide condition when the traveling assembly has not been traveling along a side wall.

Applicant asserts that the claim element "first determination means for" (claim 1, line 6), "second determination means for" (claim 1, line 10), "changing means for" (claim 1, line 14), "a working assembly for" (claim 8, line 3 and claim 11, line 5), "a moving mechanism for" (claim 8, line 9), "control means for" (claim 8, line 19 and claim 11, line 22), "rotation angle measurement means for" (claim 11, line 8), "storage means for" (claim 11, line 10), "front distance measurement means ... for" (claim 11, lines 11-13) and "determination means for" (claim 11, line 18) are means (or step) plus function limitation that invokes 35 U.S.C. 112, sixth paragraph. However, it is unclear whether the claim element is a means (or step) plus function limitation that invokes 35 U.S.C.

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112, sixth paragraph. If applicant wishes to have the claim limitation treated under 35 U.S.C. 112, sixth paragraph, applicant is required to:

(a) Amend the claim to include the phrase “means for” or “step for” in accordance with these guidelines: the phrase “means for” or “step for” must be modified by functional language and the phrase must **not** be modified by sufficient structure, material, or acts for performing the claimed function; or

(b) Show that the claim limitation is written as a function to be performed and the claim does **not** recite sufficient structure, material, or acts for performing the claimed function which would preclude application of 35 U.S.C. 112, sixth paragraph. For more information, see MPEP § 2181.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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8. Claims 1, 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (5,568,589) and Jeong (5,896,488).

For claims 1, 2 and 4, Hwang discloses a self-propelled cleaning machine comprising a front distance sensor in the front direction of the robot 3D and a second distance sensor in a diagonally forward direction of the robot 3F arranged closely (Fig. 4A, col. 3, lines 33-37). The fuzzy logic computer processes the received sensor signals and determines proximity to a wall perimeter (obstacle) (Col. 3, lines 46-50). The sensors are grouped having multiple fuzzy values (thresholds) for both the first and the second sensors, changes corresponding to the measurements and proximities of the first and second sensors (Col. 5, lines 35-55).

Hwang does not specifically disclose the value changes based on an inclination angle of the obstacle, but it would have been obvious the changes in the fuzzy values are based on the approach angle to the wall perimeter where the second sensor which, gets closer to the wall has higher number of fuzzy values than the first sensor for high degree of precision to maintain the robot spaced from the wall to prevent collision. The distance difference  $dl$  and the angular difference  $dA$  which are calculated by the fuzzy inputs (sensors measurements) correct the robot's path to maintain a predetermined distance from the wall (Col. 6, line 64 - col. 7, line 13). The fuzzy values changes based on the angle with respect to the wall. Jeong discloses determination of an angle between the robot and the wall surface and adjust the path of the robot to move

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parallel of the wall (Fig. 5, col. 5, line 46 – col. 6, line 2). It would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teaching of Hwang and Jeong to adjust the threshold value of the sensors based on an angle of the obstacle.

9. Claims 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (5,568,589), Jeong (5,896,488) and Aldred et al. (US 2005/0085947).

For claims 3, 5 and 6, Hwang discloses the first and the second sensors are provided in the front, center and on the side of the robot and pluralities of ultrasonic sensors in the front direction on both side (Fig. 4A). The fuzzy values of the first or second sensor increases when the distance to the wall gets large (Col. 5, lines 45-55). It would have been obvious this increase is based on the increases of the angle to the wall according to the measurements and arrangement of the sensors.

Hwang does not specifically disclose light emitting or optical distance sensors and the front direction ultrasonic distance sensors are provided in addition to the first and second optical distance sensors. It would have been easily achieved and produced by routine skilled in the art to provide additional distance sensors to measure distance to the obstacle in the front direction for additional readings and the angle to the obstacle is based on the directions of the ultrasonic sensors taught by Hwang. Aldred discloses pluralities of ultrasonic sensors and infra red (optical) sensors in multiple directions of the robot including the front direction and both sides and diagonally to measure distance to obstacle



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(Fig. 1 and paragraph 0043). It would have been obvious to combine the teachings of Hwang, Jeong and Aldred to provide optical distance sensors and additional ultrasonic distance sensors to acquire additional accurate measurements.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (5,568,589), Jeong (5,896,488) and Drunk et al. (5,377,106).

For claim 7, Hwang discloses the first and the second sensors are provided in the front, center and on the side of the robot and pluralities of ultrasonic sensors in the front direction on both side (Fig. 4A) but does not specifically disclose optical distance sensors, a protection cover having a recess with three side surfaces and a ceiling surface having the sensors facing the side surfaces and a third sensor provided on an inner position opposed to the ceiling surface for measuring distance to the front and diagonally below of the robot.

Drunk discloses optical distance sensors arranged in the front and diagonally (Col. 6, lines 38-54) and a protection cover in the head portion of the robot with three side surfaces, where three sensors are facing the three side surfaces and a sensor 70 positioned in the front and measuring distance diagonally below the front of the robot (Fig. 1 and 13). It would have been obvious having a recess with a ceiling surface and position the sensor on the ceiling facing diagonally toward the front of the robot is a pure design choice and it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the invention of Hwang to include protection cover

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having three sides and a sensor positioned diagonally below facing the front of the robot, taught by Drunk to position the sensors in the desired direction and detect obstacles in the front and close to the surface of the floor.

11. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (5,568,589), Jeong (5,896,488) and Kawakami (5,903,124).

For claims 8-10, Hwang discloses a traveling assembly having a wheel and a working assembly 30 for doing work on the floor surface (Fig. 4A and 5A), but does not specifically disclose a moving mechanism moving the working assembly with respect to the traveling assembly in the horizontal direction having contact sensors on the front and side of the working assembly and having a first and second retracting speed and stop the travel of the traveling assembly when a contact detected by the first contact sensor exceeded a predetermined time where the value for the time is set at a different speed depends on the travel speed.

Kawakami discloses a self-propelled robot with a moving mechanism 95 moving the working assembly with respect to the traveling assembly in the horizontal direction with contact sensors 7a-7g on the front and side of the working assembly (Fig. 1 and 5, col. 5, lines 48-64). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the invention of Hwang with a moving working assembly, taught by Kawakami and to provide a desire retracting speed when the contact sensors detected a contact with an obstacle to optimally control the robot and stop the

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traveling of the robot within a shorter contact time when the contact sensor is activated and the robot is traveling at a higher speed to optimize the reaction time for the robot when a collision is detected to prevent damage and/or overheating internal motors and/or traveling mechanism.

For claim 11, Hwang discloses a traveling assembly capable of rotating in place, a working assembly 30 attached to the front of the unit for doing work on the floor surface and a plurality of front distance measuring sensors 3C-3E spaced apart and side distance measuring sensors 3A, 3G (Fig. 4A and 5A). The distance measurements of the front sensors with the fuzzy input process performed by the fuzzy logic computer determine if the robot is close to an obstacle according to the fuzzy values (predetermined thresholds), rotating the robot to follow the boundary of the obstacle (Col. 5, line 35 - col. 6, line 26). The distance sensors sensing the distance to the wall while the robot runs along the wall are calculated and stored in memory storage, obtaining plurality of measurements to generate coordinates for the walls it is traveling (Col. 6, lines 27-53).

Hwang does not specifically disclose measuring a rotation angle of the traveling assembly, a storage means for storing the rotation angle, compares measured distance values of differences or ratio within a range and does work on a corner area based on the rotation angle stored. It would have been obvious the fuzzy logic computer perform computations from the pluralities of sensors, including various well known computation methods for example averaging

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comparing and differences, to optimally determine the distance from the obstacle and obvious to rotate the robot when an optimal range from the obstacle is determined. Kawakami discloses storing a rotation angle and perform wall following and perform cleaning work on the area of the angle stored (Fig. 11 "#103", 25 and col. 8, lines 10-41). It would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teaching of Hwang and Kawakami to perform optimal obstacle following and work on area to be cleaned.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(5,696,675) Nakamura et al. discloses a self-propelled cleaning robot having pluralities of distance sensors and working assembly moving in the horizontal direction in the rear on the robot with contact sensors to perform work in corners of boundaries.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SZE-HON KONG whose telephone number is (571)270-1503. The examiner can normally be reached on 7:30AM-5PM Mon-Fri, Alt. Fri. Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

6/21/2009

/SZE-HON KONG/  
Examiner, Art Unit 3661

/Thomas G. Black/  
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